EXHIBIT I

Franklin K. Miller, PhD.
1625 Moline Street
Stoughton, WI 53589
Email: fkmiller@wisc.edu
Telephone:608-263-2479

December 11, 2020

John J. Duffy
Swanson Martin & Bell, LLP
330 North Wabash Avenue
Suite 3300
Chicago, IL 60611

Re: Case No. 3:18-cv-01586-JSC

Rebuttal Report

Dear Mr. Duffy,

Please find below my rebuttal opinions in this matter following the review of Dr. Kasbekar's December 4, 2020 report.

SECTION I
SUMMARY OF BACKGROUND AND QUALIFICATIONS

I have an engineering background and expertise in cryogenic systems and pressure vessel design. I am an Associate Professor in the Mechanical Engineering Department of the University of Wisconsin – Madison and the Chair of the Mechanical Engineering curriculum committee. I am a member of the American Society of Mechanical Engineering (ASME) and the Cryogenic Society of America (CSA). I serve on the boards of the Cryogenic Engineering Conference and the International Cryocooler Conference.

My background, qualifications, Curriculum Vitae, and list of publications are provided in full in my previous report of November 20, 2020, which I adopt by reference here. See also my report of December 4, 2020.

SECTION II
SUMMARY OF REBUTTAL OPINIONS

I offer all of my opinions in this report to a reasonable degree of engineering and scientific certainty. My opinions in this rebuttal report are based on my education, training, and experience in cryogenics and cryogenic product design, the manufacture, function and use of such products, my review and study of the information provided regarding the circumstances of this incident, my review and study of materials on the subject MVE 808AF-GB freezer, which referenced in my prior reports. New

materials that I am relying on for the opinions herein include the rebuttal report Dr. Kasbekar of December 4, 2020. See Appendix A. My hourly rate is $350.00 for work on this case.

A. [redacted]

I [redacted]

[redacted]

[redacted]

1) [redacted]

2) [redacted]

3) [redacted]

4) [redacted]

The analysis I presented in my rebuttal report of December 4, 2020 is the correct way to do the thermal contraction analysis for cryogenic materials. I used a numerical technique that can account for a nonuniform temperature profile and for the variation of thermal expansion with temperature. An equivalent but analytical technique is described in the Barron's text Cryogenic Heat Transfer [Barron, R. and Nellis G., (2017) *Cryogenic Heat Transfer*, CRC Press, pp. 105-113]

Numerical thermal conduction analysis with temperature dependent properties is described in the text Heat Transfer by Nellis and Klein. [Nellis, G. and Klein, S. (2009) *Heat Transfer*, Cambridge University Press, pp 55-60]

These errors demonstrate clearly that Dr. Kasbekar has little or no knowledge relevant to cryogenic engineering and the associated thermal analysis techniques. The thermal contraction input to his stress analysis was nearly five times the actual value because he calculated the thermal contraction using what he evens described in his testimony as a sophomore level approach. [Kasbekar 11/20/2020 deposition pg 76 line 15 through pg 78 line 10, pg 107 line 5]. An analysis with a load that is five times higher will give results that are completely different from an analysis with the correct input conditions. The results of Dr. Kasbekar's FEA analysis are unreliable because the thermal contraction input to the model is obviously erroneous. Unfortunately, Dr. Kasbekar used the results of the FEA to support his conclusion that a fatigue crack occurred in the fill line fitting to the tank wall weld before the implosion event. He cannot use his results to support this conclusion because his analysis is fundamentally flawed given the load input is too large by a factor of five.

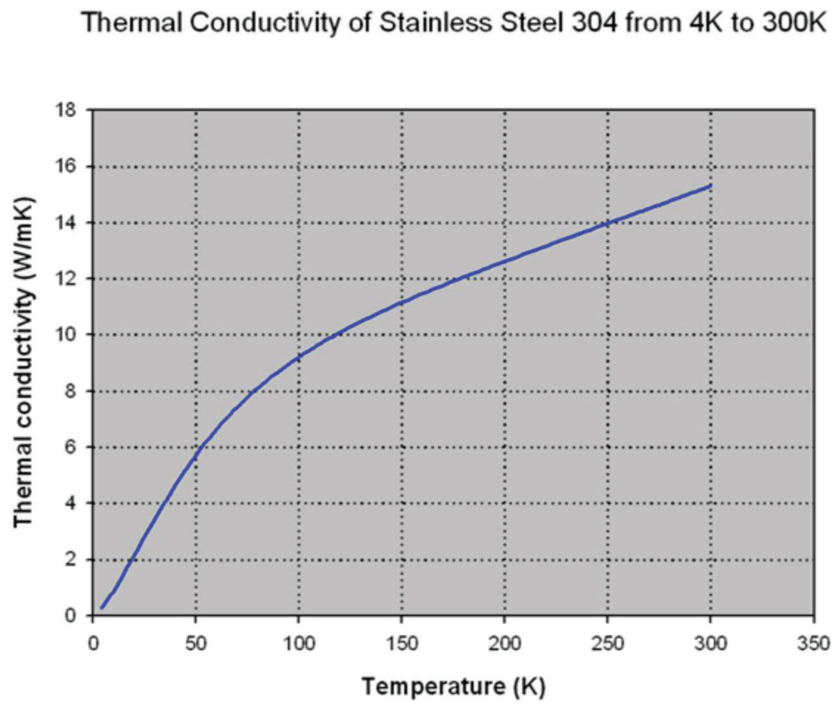


Figure 1. Thermal Conductivity of 304 Stainless Steel
https://trc.nist.gov/cryogenics/materials/304Stainless/304Stainless_rev.htm

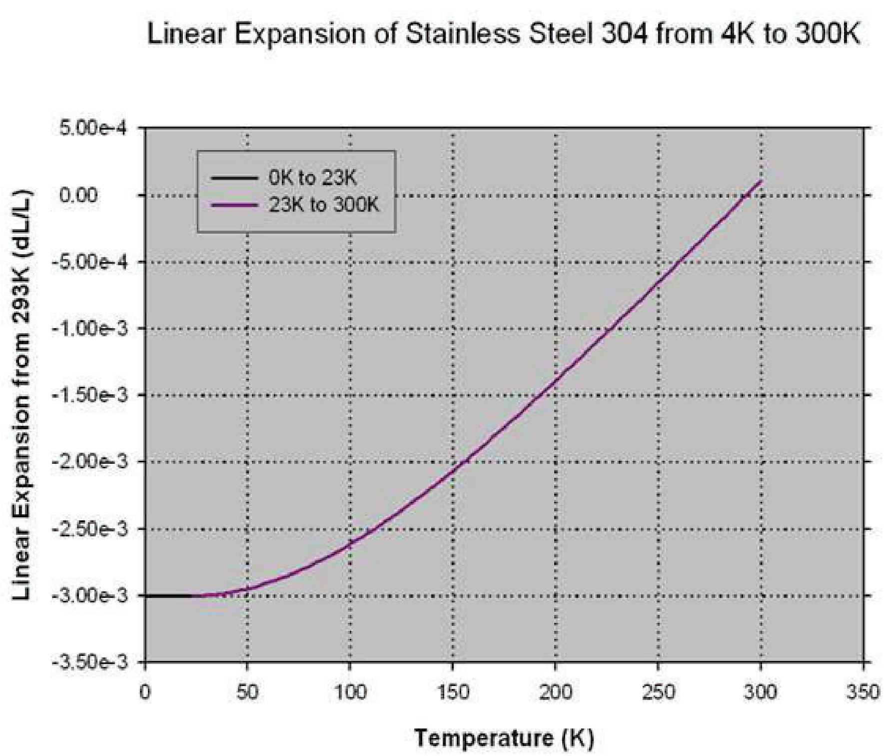


Figure 2. Total Linear Expansion of 304 Stainless Steel
https://trc.nist.gov/cryogenics/materials/304Stainless/304Stainless_rev.htm

B. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Figure 3. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

C. [redacted]

[redacted]

[redacted]

[redacted]

Figure 5. [redacted]

[redacted]

[redacted]

[redacted]

Figure 6. [redacted]

[redacted]

Figure 7. [redacted]

[redacted]

Figure 8. [redacted]

[redacted]

Figure 9. [redacted]

[redacted]

Figure 10. [redacted]

[redacted]

Figure 11. [redacted]

I reserve the right to change and supplement my opinions and conclusions following my examination of any additional case materials presented, including deposition transcripts.

Respectfully Submitted,

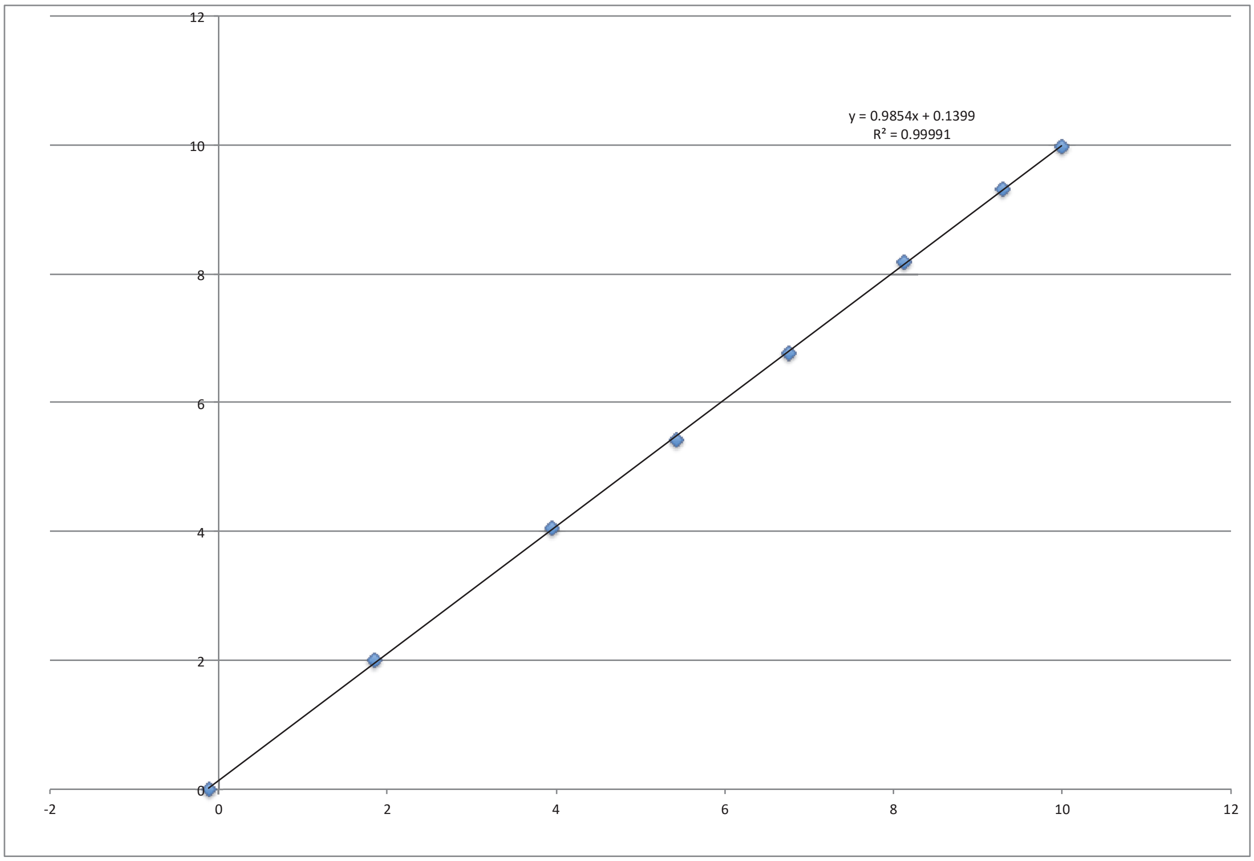
Franklin K. Miller

Appendix A: Materials Relied Upon

1. Rebuttal report from Dr. Kasbekar on December 4, 2020
2. Chart drawing B-10643376-A
3. Exemplar tank (SN# CAB2119340043) and video and photographs of same

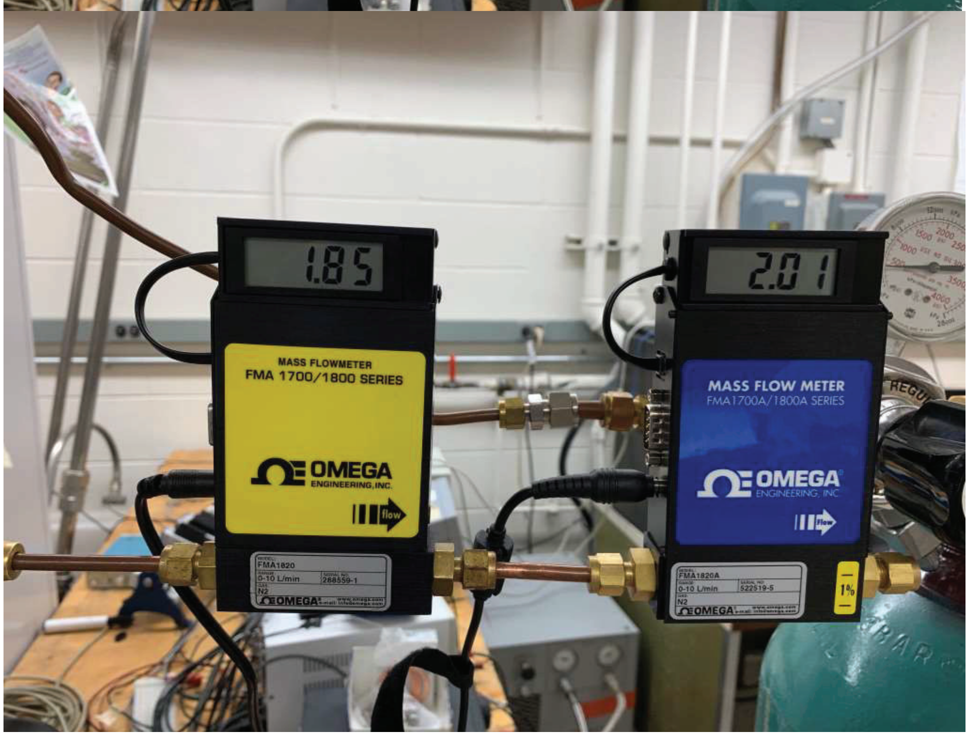
Appendix B: Flow Meter Calibration

Measured	Standard
-0.12	0
1.85	2.01
3.96	4.06
5.42	5.43
6.75	6.76
8.12	8.17
9.3	9.32
9.99	9.98



Graph of measured flowrate vs. Calibrated standard flowrate. The calibration curve is shown in the graph.


- 0.12
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
flow
0.00
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.
1%


1.85
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
flow
2.01
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.
1%


3.98
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
flow
FMA1820
0-10 L/min
288559-1
N2
4.06
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.
FMA1820A
0-10 L/min
522519-5
N2
1%


5.42
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
flow
FMA1820
0-10 L/min
288559-1
N2
5.43
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.
FMA1820A
0-10 L/min
522519-5
N2
1%


6.75
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
6.76
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.
DECREASE
INCREASE


8.12
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
ENGINEERING, INC.
8.17
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA
ENGINEERING, INC.


9.30
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
9.32
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA


9.99
MASS FLOWMETER
FMA 1700/1800 SERIES
OMEGA
9.98
MASS FLOW METER
FMA1700A/1800A SERIES
OMEGA

Appendix C: Calculations

```
V_vac=100.3[l]

t_paper_min=0.0026[in]*convert(in,m)            " Minimum Thickness of fiberglass paper in blanket layers"
t_paper_max=0.0051[in]*convert(in,m)            " Maximum Thickness of fiberglass paper in blanket layers"
t_foil=0.0007[in]*convert(in,m)                 " Thickness of Aluminum foil in blanket layers"

d=28.3125[in]*convert(in,m)                     "Diameter of tank"
L=30[in]*convert(in,m)                          "Length of Blanket"
A_layer=pi*d*L+pi*d^2/4                         "Surface area of a blanket layer"
V_min=A_layer*30*(t_paper_min+t_foil)*convert(m^3,l) "Volume of blanket materials"
V_max=A_layer*30*(t_paper_max+t_foil)*convert(m^3,l)

d_line=0.375[in]*convert(in,m)                  "Diameter of annular lines"
L_line=26[in]*convert(in,m)                     "Length of annular lines"
V_lines=pi*d_line^2*L_line*2*convert(m^3,l)     "Volume of annular lines"

V_vac_net=V_vac-V_min-V_lines                   "Volume of vacuum insulation space"
```

SOLUTION

Unit Settings: SI C kPa kJ mass deg

A_{layer} = 2.128 [m^2]	d = 0.7191 [m]
d_{line} = 0.009525 [m]	L = 0.762 [m]
L_{line} = 0.6604 [m]	t_{foil} = 0.00001778 [m]
$t_{paper,max}$ = 0.0001295 [m]	$t_{paper,min}$ = 0.00006604 [m]
V_{lines} = 0.3765 [l]	V_{max} = 9.404 [l]
V_{min} = 5.35 [l]	V_{vac} = 100.3 [l]
$V_{vac,net}$ = 94.57 [l]	

No unit problems were detected.

KEY VARIABLES

$V_{vac,net}$ = 94.57 [l]